

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings, of claims in the application:

Claims

1. **(Currently Amended)** A ~~bioabsorbable plug~~cranioplasty implant, suitable for cranial bone tissue regeneration, comprising:

(i) a first portion ~~capable of being~~ inserted into a defect of a cranial bone, the first portion having a first surface and a thickness X; and

(ii) a second portion ~~capable of~~ engaging the contour of the defect, the second portion having a second surface opposite to the first surface, the second portion having a thickness Y, the second surface extending outwardly from the first portion,

wherein the first surface has an area smaller than an area of the second surface, wherein the first and second portions are formed from expandable material, the expandable material being a porous material, and wherein the ~~first surface has an area smaller than an area of the second surface~~ratio X:Y is from 1:1 to 3:1.

2. **(Currently Amended)** The ~~plug~~cranioplasty implant according to claim 1, wherein the ~~plug~~cranioplasty implant has a completely interconnected architecture.

3. **(Currently Amended)** The ~~plug~~cranioplasty implant according to claim 1, wherein the ~~plug~~cranioplasty implant is shaped like at least one of a cone, truncated-cone, a pentahedron, a truncated-pentahedron, and a button mushroom.

4. **(Cancelled)**

5. **(Currently Amended)** The ~~plug~~cranioplasty implant according to claim 1, wherein the first surface and second surface are plane surfaces.

6-8. *(Cancelled)*

9. *(Currently Amended)* The ~~plug~~plugcranioplasty implant according to claim 1, wherein the expandable material comprises bioresorbable polycaprolactone (PCL).

10. *(Currently Amended)* The ~~plug~~plugcranioplasty implant according to claim 9, wherein the expandable material is prepared by layering PCL filaments layer by layer.

11-12. *(Cancelled)*

13. *(Currently Amended)* The ~~plug~~plugcranioplasty implant according to claim 1, wherein the expandable material comprises bioresorbable tricalcium phosphate-polycaprolactone (TCP-PCL).

14-18. *(Cancelled)*

19. *(Currently Amended)* The ~~plug~~plugcranioplasty implant according to claim 1, further comprising a bioactive agent.

20. *(Currently Amended)* The ~~plug~~plugcranioplasty implant according to claim 1, further comprising cells seeded on the ~~plug~~plugcranioplasty implant.

21-27. *(Cancelled)*

28. *(Currently Amended)* The ~~plug~~plugcranioplasty implant according to claim 1, wherein the first surface and second surface have circular, square or rectangular shapes.

29. *(Currently Amended)* The ~~plug~~plugcranioplasty implant according to claim 1, wherein the ~~plug~~plugcranioplasty implant has a tapered shape.

30-32. *(Cancelled)*

33. *(Currently Amended)* The ~~plug~~plugcranioplasty implant according to claim 10, wherein the expandable material is prepared by layering the PCL filaments layer by layer by using the Fused Deposition Modeling (FDM) technology.

34. *(Currently Amended)* The ~~plug~~cranioplasty implant according to claim 10, wherein the layers of PCL filaments have an orientation of at least one of 0 degree, 60 degree and 120 degree.

35. *(Cancelled)*

36. *(Currently Amended)* The ~~plug~~cranioplasty implant according to claim 13, wherein the TCP-PCL is TCP-PCL 20:80%.

37. *(Currently Amended)* The ~~plug~~cranioplasty implant according to claim 13, wherein the TCP-PCL has a porosity of 60-70%.

38. *(Withdrawn)* The plug implant according to claim 23, wherein the plug implant comprises an opening for placement and removal of a catheter.

39. *(Currently Amended)* The ~~plug~~cranioplasty implant according to claim 1, wherein the ~~plug~~cranioplasty implant expands at contact with hydrophilic solution, hydrophilic liquid and/or body fluid.

40. *(Currently Amended)* The ~~plug~~cranioplasty implant according to claim 1, wherein the ~~plug~~cranioplasty implant is suitable to be inserted into a defect of a cranial bone and the ~~plug~~cranioplasty implant does not require means for fixing the ~~plug~~cranioplasty implant to the external surface of the cranial bone.

41-42. *(Cancelled)*

43. *(Currently Amended)* The ~~plug~~cranioplasty implant according to claim 20, wherein the cells are stem cells.

44. *(Currently Amended)* The ~~plug~~cranioplasty implant according to claim 20, wherein the cells are mesenchymal stem cells.

45-70. *(Cancelled)*

71. *(Withdrawn)* A method for bone tissue regeneration comprising the steps of:

providing a bioabsorbable plug implant according to claim 23;

inserting a first portion of the plug implant into a defect or gap of a bone, a second portion of the plug implant engaging the outside contour of the defect or gap; and

allowing the plug implant to contact body fluids, thereby expanding the size of the plug implant so that the plug fits into the defect or gap.

72. *(Withdrawn)* The method according to claim 71, wherein the plug implant is formed from a porous material allowing the bone cells to penetrate into the plug implant and to regenerate the bone tissue.

73. *(Withdrawn)* The method according to claim 71, wherein the method is for performing cranioplasty.

74. *(Withdrawn)* The method according to claim 71, wherein plug implant and the bone defect or gap have an initial tolerance of less than 1 mm.

75. *(Withdrawn)* The method according to claim 74, wherein the initial tolerance is less than 0.5 mm.

76. *(Withdrawn)* The method according to claim 74, wherein the initial tolerance is less than 0.2 mm.

77. *(Withdrawn)* The method according to claim 71, further comprising placing a catheter into an opening of the plug implant for performing drainage.

78. *(Withdrawn)* The method according to claim 71, wherein the insertion of the plug implant into the bone defect does not require means for fixing the plug to the external surface of the bone surrounding the defect.

79. *(Withdrawn)* The method according to claim 71, wherein the method is a non-therapeutic method for the cosmetic restoration of undesirable osseous gaps.

80. *(Withdrawn)* The method according to claim 71, wherein the plug implant further comprises seeding cells on the bioabsorbable scaffold of the plug implant.

81. *(Withdrawn)* The method according to claim 80, wherein the cells are stem cells.
82. *(Withdrawn)* The method according to claim 80, wherein the cells are mesenchymal stem cells.
83. *(Withdrawn)* A kit comprising the plug implant according to claim 23.
84. *(New)* The cranioplasty implant according to claim 1, wherein the ratio X:Y is from 2.75:1 to 3:1.